gave the results of his investigations on the tissues of the higher animals as to their power of combining iodide intramolecularly. After administering potassium iodine to fowls and analyzing during ten weeks the eggs and later the tissues, he concludes that the power of combining iodine in the organism belongs only to certain keratins, such as that of the hair, to certain proteids, such as that of the thyroid gland, and to certain fats. Professor Wesley Mills (McGill) spoke of the 'Correlation of the functional and anatomical development of the cerebrum.' Professor Chittenden reported progress in the investigation of the properties of the edible and poisonous fungi which was undertaken by a committee of the Society appointed for this purpose two years ago.

At the afternoon session on Friday, Professor G. Carl Huber presented 'A note on the sensory nerve-endings in the extrinsic eye-muscles of the rabbit—atypical motor endings of Retzius. The author has repeatedly observed these nerve-endings and gave reasons for believing them to be sensory and not motor. In the absence of Professor L. B. Mendel (Yale), a paper by him, on 'The paths of absorption from the peritoneal cavity,' was read by the President. In a number of experiments upon absorption it was observed that the solution employed appeared in the urine considerably earlier than in the lymph. The author is inclined to the blood-vessel theory of absorption. Drs. P. A. Levene and I. Levin (New York), made a preliminary communication on the absorption of the proteids. Because of their easy identification iodoproteids were studied, being injected into a loop of the intestine and later sought for in the lymph. The results were negative and in so far tend to confirm the accepted theory of absorption by the blood system. By invitation Professor E. O. Jordan (Chicago) gave the results of experiments upon 'The production of fluorescent pigment by bacteria.' The presence of both phosphorus and sulphur is essential to the formation of this pigment. The relative fluorescigenic values of a variety of chemical bodies were studied. The presence of acid and diffuse daylight are unfavorable to pigment production. Professor C. F. Hodge described for Mr. H. H. Goddard a new brain microtome which is constructed on two new principles: the knife, which is stationary, is level in order to carry liquid in which the section floats, and the brain is moved against the knife. By invitation Dr. L. J. J. Muskens (New York) exhibited an instrument for measuring muscular tonicity in man.

In addition to the above papers, a number of others were read by title. The following were elected members of the Society: Professor W. O. Atwater (Wesleyan), Professor S. P. Budgett (Washington), Dr. A. M. Cleghorn (Harvard), Dr. W. J. Gies (Columbia), Professor W. S. Hall (Northwestern), Dr. Walter Jones (Johns Hopkins), Professor E. O. Jordan (Chicago), Dr. A. P. Mathews (Tufts), Professor B. Moore (Yale), Dr. C. C. Stewart (Columbia) and Professor F. F. Westbrook (Minnesota). There were elected as members of the Council for 1898–'99: Professors Chittenden, Howell, Lee, Lombard and Porter. The details of the establishment of the *American Journal of Physiology*, under the auspices of the Society, were presented and made a part of the records. The *Journal*, now in its second volume, has abundantly justified its existence.

FREDERIC S. LEE,
Secretary.

SCIENTIFIC BOOKS.

The Discharge of Electricity through Gases. By J. J. THOMSON. New York, Charles Scribner's Sons. 1898. Small 8vo. Pp. 203. Price, $1.00.

This volume contains, in modified form, the four lectures delivered by Professor Thomson

on the occasion of the sesqui-centennial celebration at Princeton, in October, 1896. As the subject is one that is rapidly developing, the author has added the results of numerous investigations that have been published since that time; so that the present volume gives an excellent presentation of the subject as it now stands.

Although the electrical discharge in gases has been investigated in its various phases ever since the study of electricity itself began, it is only in the last five or six years that our knowledge of the subject has begun to take systematic and satisfactory form. Careful observations had been made by hundreds of physicists, and the scientific literature abounded with descriptions of phenomena of great interest and undoubted scientific importance. But our knowledge of the subject consisted of a mass of *isolated* facts; no satisfactory underlying theory had been found by which these facts could be correlated. The development of such a theory is largely due to Professor Thomson, and I know of no place where it is so satisfactorily treated as in the volume before us. The book is not one requiring the preparation of a specialist in order that it may be understood; the greater part can be read with pleasure and profit by one having only an elementary knowledge of electrical science. On the other hand, I should not speak of the book as containing merely a 'popular' account of the subject, especially if the word 'popular' is to be regarded as having the same significance as inaccurate. Writers of popular science are, unfortunately, only too prone to look upon the two words as synonymous. Professor Thomson, however, possesses the rare power of writing upon a difficult subject with scientific accuracy, and at the same time in such a way as to be intelligible to the lay reader.

The contents of the book are arranged under three chief sub-divisions, namely: the Discharge of Electricity through Gases; Photo-electric Effects, and Cathode Rays. This classification is not wholly satisfactory, for each sub-division contains a great deal more than is indicated by its title. But the numerous sub-headings, to which reference is made in the table of contents, make it a matter of no great difficulty to find any special topic sought. A fairly complete series of references to original sources constitutes a feature that cannot be too highly commended.

To one unfamiliar with the subject the first twenty pages will probably prove the most difficult portion of the book. The topics there discussed are the various methods by which a gas may be electrified: for example, by chemical processes, by electrolysis, and by the splashing of liquids. The essential peculiarities of the conducting power of gases are first brought into prominence in the account of the effect of Röntgen rays in giving to a gas the power of conducting electricity. Only a few weeks after the discovery of the X-rays it was found that an electrified body rapidly lost its charge when exposed to these rays. This property of the new rays was independently and almost simultaneously discovered by at least five different physicists, Professor Thomson being one of these, and has since been the subject of numerous investigations. The subject is one in which experimental errors are especially difficult to avoid, and a great deal of confusion naturally existed at first regarding the laws of the phenomenon and the conditions of its occurrence. Practically all of the more reliable experiments are now seen to support the view that the discharge of an electrified body by the Röntgen rays is due to the fact that the gas surrounding the body is made a conductor by the action of these rays. It is thought that the condition developed in the gas is somewhat similar to that in an electrolyte, *i. e.*, *ions* are formed, some carrying positive charges and others negative charges. A charged body placed in the 'ionized' gas would attract one kind of ions and repel the other. Upon coming into contact with the charged body the ions are supposed to give up their charges and cease to exist as ions. The gas is thus rendered capable of conducting electricity in much the same manner that an electrolyte conducts. But an essential difference exists between the two cases, due to the fact that the ionized condition of the gas is only *temporary;* in less than a second after the Röntgen rays have ceased the ions have recombined and the gas is as good an insulator as ever.

Conducting power may be imparted to a gas

not only by the action of Röntgen rays, but also by extreme heat and by the chemical changes that occur in flames. These cases are considered in the second part of the book. Here also the effects are readily explained upon the theory that the conduction is electrolytic. In fact, it is the development of this theory in its application to the various types of gaseous conduction that constitutes the most characteristic feature of the book. An accidental error in one of the formulas on page 37, whose consequences appear also in some of the equations on the two succeeding pages, may cause annoyance to one reading hurriedly. A serious misprint occurs on page 42, where 10^{-11} appears several times as 10^{11}.

An interesting account is given, in the second division of the book, of the curious effect of light in causing the discharge of *negative* electricity. This effect is produced chiefly by the shorter light waves, and preeminently by the invisible ultra-violet rays of the spectrum. It depends not only upon the gas surrounding the charged body, but also upon the nature of the charged surface. The electro-positive metals, such as zinc, sodium and rubidium, show the effect best. The fact that phosphorescent substances are especially sensitive to this effect, though as yet unexplained, is of undoubted significance.

The third section of the book, devoted to cathode rays, contains an excellent account of the recent experiments on this subject. Such an account is of especial value because of the extraordinary rapidity with which our knowledge of these rays has advanced. It is interesting to note that the study of cathode rays, as well as the study of the other phenomena of vacuum tubes, has received a fresh impetus since the discovery of the X rays; if this study leads to important discoveries, as it now seems almost certain to do, I think that these must be regarded as indirect results of the discovery of Röntgen.

It is quite out of the question to call attention in this brief review to the many interesting and important subjects that are discussed throughout the book. The discussion is often brief and lacking in the detail that would be useful to one making a specialty of the subject. But the book is written by one whose own investigations have contributed largely to the development of each of the topics considered, and who is now engaged in further research along the same lines. This fact gives to the treatment a charm impossible of attainment otherwise, and adds to the book a suggestiveness and inspiration which must appeal to all who read it. ERNEST MERRITT.

Text-book of Physiology. Edited by E. A. SCHÄFER, LL.D., F.R.S. Vol. I. New York, The Macmillan Co.

This new text-book of physiology follows out the idea of combining under one editorship the writings of different men who treat of the special subjects in physiology with which they have had personal and intimate experience. In the face of the great and ever widening scope of the science of physiology, no work of general authority can be written in any other manner to-day.

In illustration of this we find in this volume, which covers merely the chemical side of physiology, reference to fully six thousand original articles. The book is highly creditable to the eleven English physiologists who have contributed to it, and it strengthens the general opinion that in physiology the English are second only to the Germans. The Germans, however, have no such comprehensive and thorough reference text-book as this. The work is hardly one for medical students, but is intended for the teacher, for the advanced investigator, or for reference in the medical library.

The article on the chemistry of the digestive processes is ably written by B. Moore. He attacks the theory of the cleavage of proteid into two molecules, the 'hemipeptone' and 'antipeptone,' for example, and claims that the existence of the 'hemi-' bodies has never been proved. He suggests that trypsin may act on a single molecule of albumose which may yield a greater or lesser quantity of amido acids according to the albumose used, and that the residue of the molecule which cannot be further attacked by trypsin is antipeptone. In the discussion of the composition of the fæces, Moore, in common with almost every text-book of physiology, makes the mistake of giving too